fw

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/773,646	02/05/2004	Ashok Mantravadi	030262	7644

23696 7590 10/19/2007

QUALCOMM INCORPORATED
5775 MOREHOUSE DR.
SAN DIEGO, CA 92121

EXAMINER	
YUN, EUGENE	
ART UNIT	**PAPER NUMBER**
2618	

NOTIFICATION DATE	DELIVERY MODE
10/19/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

us-docketing@qualcomm.com
kascanla@qualcomm.com
nanm@qualcomm.com

Office Action Summary	Application No. 10/773,646	Applicant(s) MANTRAVADI ET AL.	
	Examiner Eugene Yun	Art Unit 2618	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 August 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-34* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

2. Claims 1-5, 7, 8, 12-14, 17-22, and 27-34 are rejected under 35 U.S.C. 102(e) as being anticipated by Kowalewki (US 7,155,165).

Referring to Claim 1, Kowalewki teaches a method of recovering first and second data streams transmitted simultaneously via a wireless channel in a wireless communication system (see col. 4, lines 21-23), comprising:

deriving a first channel estimate for the wireless channel based on received symbols (see col. 7, lines 35-38);

performing detection for the first data stream using the first channel estimate (see col. 3, lines 13-18);

deriving a second channel estimate based on the detected first data stream (see col. 7, lines 38-41);

deriving a third channel estimate based on the first and second channel estimates (see col. 6, lines 27-38); and

performing detection for the second data stream using the third channel estimate (see col. 4, lines 41-47).

Claim 30 has similar limitations as Claim 1.

Referring to Claim 2, Kowalewki also teaches the first channel estimate for the wireless channel is derived based on received pilot symbols (see col. 7, lines 35-38).

Referring to Claims 3 and 31, Kowalewki also teaches estimating interference due to the first data stream using the third channel estimate, and wherein the detection for the second data stream is performed with the estimated interference from the first data stream canceled (see col. 6, lines 27-38).

Referring to Claim 4, Kowalewki also teaches the first and second data streams are combined prior to transmission via the wireless channel (see 80 in fig. 2).

Referring to Claim 5, Kowalewki also teaches deriving the first channel estimate including obtaining a frequency response estimate for the wireless channel based on the received pilot symbols (see col. 6, lines 54-56),

deriving a time-domain impulse response estimate for the wireless channel based on the frequency response estimate (see col. 8, lines 24-27), and

deriving the first channel estimate based on the time-domain impulse response estimate (see col. 10, lines 62-66).

Referring to Claim 7, Kowalewki also teaches deriving the second channel estimate including obtaining a frequency response estimate for the wireless channel based on the received pilot symbols (see col. 7, lines 38-41),

deriving a time-domain impulse response estimate for the wireless channel based on the frequency response estimate (see col. 8, lines 24-27), and

deriving the first channel estimate based on the time-domain impulse response estimate (see col. 10, lines 62-66).

Referring to Claim 8, Kowalewki also teaches the first and second channel estimates as time-domain impulse response estimates, and wherein the third channel estimate is a frequency response estimate derived by combining and transforming the time-domain impulse response estimates for the first and second channel estimates (see col. 8, lines 24-47).

Referring to Claim 12, Kowalewki also teaches the detection for the first data stream performed on received data symbols and provides detected symbols for the first data stream (see col. 3, lines 31-18).

Referring to Claims 13 and 32, Kowalewki also teaches decoding the detected symbols for the first data stream to obtain decoded data for the first data stream, and re-encoding the decoded data to obtain remodulated symbols for the first data stream, and wherein the second channel estimate is derived based on the remodulated symbols and the received data symbols (see col. 6, lines 14-27).

Referring to Claim 14, Kowalewki also teaches mapping the detected symbols for the first data stream to modulation symbols based on a modulation scheme used for the first data stream, and wherein the second channel estimate is derived based on the modulation symbols and the received data symbols (see col. 5, line 64 to col. 6, line 8).

Referring to Claim 17, Kowalewki also teaches filtering the first channel estimate, and wherein the third channel estimate is derived based on the filtered first channel estimate (see col. 9, line 65 to col. 10, line 14).

Referring to Claim 18, Kowalewki also teaches filtering the second channel estimate, and wherein the third channel estimate is derived based on the filtered second channel estimate (see col. 12, lines 45-67).

Referring to Claim 19, Kowalewki also teaches filtering the third channel estimate, and wherein the detection for the second data stream is performed using the filtered third channel estimate (see col. 12, lines 45-67).

Referring to Claim 20, Kowalewki also teaches filtering the first, second, or third channel estimate in time domain or frequency domain (see col. 9, line 65 to col. 10, line 14).

Referring to Claim 21, Kowalewki also teaches an infinite impulse response filter (see col. 9, line 65 to col. 10, line 14 noting that an IIR filter is well known in the art).

Referring to Claim 22, Kowalewki also teaches a finite impulse response filter (see col. 9, line 65 to col. 10, line 14 noting that an FIR filter is well known in the art).

Referring to Claim 27, Kowalewki teaches an apparatus operable to recover first and second data streams transmitted simultaneously via a wireless channel in a wireless communication system (see col. 4, lines 21-23), comprising:

a channel estimator operative to derive a first channel estimate for the wireless channel based on received symbols (see col. 7, lines 35-38), derive a second channel estimate based on detected symbols for the first data stream (see col. 7, lines 38-41), and derive a third channel estimate based on the first and second channel estimates (see col. 6, lines 27-38); and

a detector operative to perform detection for the first data stream using the first channel estimate (see col. 3, lines 13-18), provide the detected symbols for the first data stream, perform detection for the second data stream using the third channel estimate, and provide detected symbols for the second data stream (see col. 4, lines 41-47).

Referring to Claim 28, Kowalewki also teaches the detector further operative to estimate interference due to the first data stream using the third channel estimate and to perform detection for the second data stream with the estimated interference from the first data stream canceled (see col. 4, lines 41-47).

Referring to Claim 29, Kowalewki also teaches a receive data processor operative to decode the detected symbols for the first data stream to obtain decoded data for the first data stream and to re-encode the decoded data to obtain remodulated symbols for the first data stream, and wherein the channel estimator is operative to

derive the second channel estimate based on the remodulated symbols and received data symbols (see col. 6, lines 14-27).

Referring to Claim 33, Kowalewki teaches a method of recovering a base stream and an enhancement stream transmitted simultaneously via a wireless channel in a wireless communication system (see col. 4, lines 21-23), comprising:

deriving a first channel estimate for the wireless channel based on received pilot symbols (see col. 7, lines 35-38);

performing detection for the base stream using the first channel estimate to obtain detected symbols for the base stream (see col. 3, lines 13-18);

decoding the detected symbols for the base stream to obtain decoded data for the base stream (see col. 4, lines 38-40);

re-encoding the decoded data for the base stream to obtain remodulated symbols for the base stream (see col. 6, lines 14-27);

deriving a second channel estimate based on the remodulated symbols (see col. 7, lines 38-41);

deriving a third channel estimate based on the first and second channel estimates (see col. 6, lines 27-38);

estimating interference due to the base stream using the third channel estimate (see col. 6, lines 54-56);

performing detection for the enhancement stream, with the estimated interference from the base stream canceled and using the third channel estimate, to obtain detected symbols for the enhancement stream; and decoding the detected

symbols for the enhancement stream to obtain decoded data for the enhancement stream (see col. 4, lines 41-47).

Referring to Claim 34, Kowalewki also teaches deriving the first channel estimate including obtaining a frequency response estimate for the wireless channel based on the received pilot symbols (see col. 6, lines 54-56),

deriving a time-domain impulse response estimate for the wireless channel based on the frequency response estimate (see col. 8, lines 24-27), and

deriving the first channel estimate based on the time-domain impulse response estimate (see col. 10, lines 62-66).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 6 and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kowalewki in view of Cioffi et al. (US 5,995,567).

Referring to Claim 6, Kowalewki does not teach the time-domain impulse response estimate derived by performing an inverse fast Fourier transform (IFFF) on the frequency response estimate, and wherein the first channel estimate is derived by performing a fast Fourier transform (FFF) on the time-domain impulse response

estimate. Cioffi teaches the time-domain impulse response estimate derived by performing an inverse fast Fourier transform (IFFF) on the frequency response estimate, and wherein the first channel estimate is derived by performing a fast Fourier transform (FFF) on the time-domain impulse response estimate (see col. 1, lines 44-50). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the teachings of Cioffi to said device of Kowalewki in order to better compensate for RF interference.

Referring to Claim 9, Cioffi also teaches the first channel estimate comprising channel gain estimates for a first group of subbands and the second channel estimate comprises channel gain estimates for a second group of subbands, and wherein the third channel estimate is derived based on a concatenation of the channel gain estimates for the first and second groups of subbands (see col. 11, lines 18-22).

Referring to Claim 10, Cioffi also teaches the third channel estimate derived by frequency interpolation of the channel gain estimates for the first and second groups of subbands (see col. 8, lines 50-56).

Referring to Claim 11, Cioffi also teaches the first group of subbands is used for pilot transmission and the second group of subbands is used for data transmission (see col. 7, lines 8-14).

5. Claims 15, 16, and 23-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kowalewki and Cioffi and further in view of Isaksson et al. (US 6,181,714).

Referring to Claim 15, the combination of Kowalewki and Cioffi does not teach the deriving a third channel estimate including scaling the first channel estimate with a first scaling factor, scaling the second channel estimate with a second scaling factor, and combining the scaled first channel estimate and the scaled second channel estimate to obtain the third channel estimate. Isaksson teaches the deriving a third channel estimate including scaling the first channel estimate with a first scaling factor, scaling the second channel estimate with a second scaling factor, and combining the scaled first channel estimate and the scaled second channel estimate to obtain the third channel estimate (see col. 2, lines 51-67). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the teachings of Isaksson to the modified device of Kowalewki and Cioffi in order to ensure better compatibility with high-bandwidth systems.

Refering to Claim 16, Isaksson also teaches the first and second scaling factors selected based on reliability of the first channel estimate relative to reliability of the second channel estimate (see col. 2, lines 51-67).

Refering to Claim 23, Isaksson also teaches the wireless communication system utilizing orthogonal frequency division multiplexing (OFDM) (see col. 2, lines 40-45).

Referring to Claim 24, Isaksson also teaches the received pilot symbols are obtained in each OFDM symbol period and for a set of subbands used for pilot transmission (see col. 12, lines 13-24).

Referring to Claim 25, Isaksson also teaches the received pilot symbols are obtained for OFDM symbol periods used for pilot transmission, wherein the first channel estimate is derived for each OFDM symbol period used for pilot transmission, and wherein the second channel estimate is derived for each OFDM symbol period used for data transmission (see col. 12, lines 13-24).

Referring to Claim 26, Isaksson also teaches the wireless communication system as a multiple-input multiple-output (MIMO) communication system, and wherein the first and second data streams are transmitted simultaneously from a plurality of antennas (see col. 9, lines 20-26).

Response to Arguments

6. Applicant's arguments with respect to claims 1-34 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eugene Yun whose telephone number is (571) 272-7860. The examiner can normally be reached on 9:00am-6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew D. Anderson can be reached on (571)272-4177. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Eugene Yun
Examiner
Art Unit 2618

EY